

COURSE :

Understanding Hydraulic Systems and Components

3 Day Seminar /
24 hours



DESCRIPTION :

Hydraulic equipment has become so influential in the design of industrial machinery, that without Hydraulic Systems, automation as we know it would not be possible. Through the use of Hydraulics, we have the ability to transmit and control energy.

The course begins with a review of hydraulic principles and progresses through hydraulic system components including pumps, valves, cylinders, motors, rotary actuators, accumulators and filters with emphasis placed on component structure and the identification of the components by the proper symbol as standardized by A.N.S.I. and ISO. Methods of instruction include lecture, discussion, audio-visual material including power point presentation, animation of components and systems, hands-on lab exercises with real world hydraulic components and actual operating training stations.

Several hands-on lab exercises require the students to troubleshoot real world system problems. Every application which is being discussed will be totally dissected in an animated program. This animation program allows the instructor to recalibrate; pressure, flow, torque, load and even upsize and downsize of components. This course can also be totally customized to your application.

Each student receives:

- 1 Published textbook
Understanding Hydraulic Systems and Components
- 2 Fluid Power Data Book
- 3 Symbol Poster
- 4 Course Certificate

For registration or more information call **303.838.7396**
or email armin@deltaparadigm.com

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COURSE OUTLINE:

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HYDRAULIC PRINCIPLES

- △ Pressure and Force
- △ Pascal's Law
- △ Intensifiers
- △ Work, Power, Energy
- △ System Efficiency and Heat

▣ Pumps

- o Review of principles
- o Positive-displacement pumps
- o Non positive-displacement pumps
- o Fixed and variable displacement pumps
- o Pressure compensated pumps
- o Cavitations and entrained air
- o Pump wear

▣ Flow Control Valves

- o Actuator speed
- o Placement of flow control in hydraulic systems
- o Pressure compensation
- o Temperature compensation
- o Application of flow dividers

▣ Directional Control Valves

- o Summary of symbols
- o Valve operators
- o Center positions
- o Solenoid valves
- o Mobile valve stacks
- o Porting and ISO standards

▣ Check valves

- o Design and application
- o Pilot operated check valves
- o Shuttle valve application

▣ Hydraulic cylinders

- o Single and Double Acting Cylinders
- o Seal material compatibility
- o Seal installation
- o Cylinder construction
- o Cylinder mounting methods
- o Sizing of a cylinder
- o Regenerative circuits
- o Test for piston seal leakage
- o Cylinder in a closed center system
- o Cylinder drift with closed and open center spool
- o Pressure intensification

▣ Hydraulic Motors

- o Speed and Torque
- o Sizing of a hydraulic motor
- o Hydraulic motors in circuits
- o Hydrostatic transmission

▣ Hydraulic Rotary actuators

- o Design Features
- o Sizing of rotary actuators
- o Applications of rotary actuators

▣ Pressure Control Valves

- o Pressure control and regulating
- o Pressure relief valves
- o Pressure sequence valves
- o Counter balance valves

- o Over center valves
- o Unloading valves
- o Pressure reducing valves
- o Pressure control valves in circuits

▣ Pilot Operated Pressure control valves

- o Pilot operated pressure relief valve
- o Advantages and Application

▣ Accumulators

- o Design Features
- o Applications
- o Charging the accumulator
- o Installation considerations
- o Sizing accumulators
- o Checking gas precharge pressure

▣ Fluid Conductors

- o Sizing of pipes and hoses
- o Pipe sealing
- o Hoses, fittings and installation
- o Rated operating pressure
- o Hose assembly and routing tips
- o Preventing hydraulic leaks
- o Friction and restriction in fluid lines

▣ Reservoirs, Heat exchangers and Filters

- o Design features of oil reservoirs
- o Pressurized oil tanks
- o Heat exchangers
- o Contamination control
- o Filtration methods
- o ISO cleanliness code

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